

Q, from Mogador, had nearly, but not entirely, assumed the adult dress when it died; except for its much larger size, it is hardly distinguishable from *F. barbarus*, as the rufous on the nape is similar in extent and disposition to the nuchal collar of that species, but is not quite so bright and is rather more intermingled with slaty black; most of the feathers on the crop have somewhat indistinct dark shaft-marks: the breast and abdomen are spotted as in T; but the spots are a little larger.

I have not had a recent opportunity of examining X, from Tangier; but I have a note, made some time since, to the effect that it much resembles specimen R.

Before leaving the subject of *F. peregrinus* and its allies, it will be right that I should mention the two Sardinian Falcons for which Mr. Sharpe, in the 'Annals and Magazine of Natural History' for January 1873, proposed the specific name of *brookei* (subsequently withdrawn in his 'Catalogue'); but as I have not recently examined these specimens, which are preserved in the British Museum, I defer my remarks upon them till my next paper, hoping, in the interim, to be able to visit the Museum and to see them there.

[To be continued.]

XXII.—*On the Remains of an extinct gigantic Bird supposed to be allied to Cariama, from the Ossiferous Caves of Brazil**. By J. REINHARDT.

It has long been known that the caves in the limestone mountains of Brazil contain bones of other vertebrate classes besides the very numerous mammalian remains which are buried in them. The former certainly are but few in number as compared with the latter; but bones of birds more particularly are found in some caves in no small quantity; and though a part of them may be of doubtful antiquity, others possess those characteristics which are found in those bones which are usually described as *fossil*.

As yet, however, but very little has been made known con-

* Translated from the Vid. Meddelelser fra den Naturhistoriske Forening i Kjöbenhavn, 1881 (pp. 141-153).

cerning the fossil bones of birds from the Brazilian limestone caves; and for this we are indebted, as we shall see, almost exclusively to the late Dr. P. W. Lund. His collection of animal-remains from these caves contains bones of birds by hundreds, which he procured in the course of his long-continued investigations. He was also for some time occupied in carefully examining them, and more than once has mentioned in print these studies and their results, though certainly with great brevity. At the conclusion of the last of the letters which he addressed to the editors of the 'Annales des Sciences Naturelles' concerning his discoveries in the caves, which is dated the 1st of April 1840, and is printed in the May number of that periodical for the same year, he stated that he possessed remains of a not inconsiderable number of species of birds. But he did not convey any more precise information respecting them, beyond saying that amongst them were two *Rheas*, of which one had been considerably larger than the now-existing *Rhea americana* (*l. c.* p. 219).

Early in 1841 Lund addressed to our Royal Society of Sciences an account of the remains of birds which he had at that time found and worked out. This paper was only of moderate extent, filling twenty quarto pages in manuscript, with thirteen coloured drawings of six bones supposed to belong to five different birds. It was intended to form the concluding part of the fourth treatise (dated January 30, 1841, and forwarded at the same time to the Society) of the series which was then being published under the common title of 'Blik paa Brasiliens Dyreverden för sidste Jordomvæltning' (Observations on the Animal World of Brazil before the last Geological Revolution). This paper was not, however, printed along with the remaining portion of the treatise; nor did he ever decide to have it published afterwards. But he made an abstract of the section concerning the birds, as well as of the rest of the fourth treatise; and this abstract, of which the original manuscript is still in existence, was printed entire and unaltered in the 'Proceedings' of the Danish Royal Society for 1840-41 (p. lxiii). From this we gather that at that time

Lund had determined more or less accurately 33 fossil species of birds, belonging to 26 genera, mostly such as are still represented in the same region, and of which some are peculiar to America, as, for instance, *Furnarius*, *Anabates*, *Dendrocolaptes*, *Crypturus*, and *Rhea*. We gather, moreover, that several species agree in a remarkable degree with those now existing, and, finally, that only one of those discovered was wholly different, in other words, unquestionably generically distinct from all birds of the present age, being most likely an extinct species of Illiger's family *Alectorides*, allied to the *Seriema* (*Cariama*), but of the size of the *Rhea*. As it appears from the unpublished treatise that Lund at that time did not consider that he possessed remains of more than one species of *Rhea*, we may conclude, though nothing is said about it directly, that this gigantic "Alectoride" is identical with one of those species of *Rhea* which he had shortly before alluded to in the 'Annales des Sciences Naturelles.'

The principal result which Lund considers himself justified in deducing is this, that all the laws which he had established concerning the relation between the present mammalian fauna of Brazil and that which had last preceded it, held good for the class of birds as well. These two notices are all that Lund published on the subject; but he continued to direct his attention to the remains of birds in the caves, and when he at last, a few years later, abandoned all further researches in caves, he possessed not only more bones of birds, but also bones of more species, than in 1841. It is not, however, probable that he entered on a thorough investigation of his new finds: the great majority of the bones of birds in his collection are not determined in his autograph catalogue of them; in many cases even the indication of the caves where they were found is wanting; and a portion of them have not even been registered.

Besides Lund, the late Professor P. Gervais also published a contribution to the knowledge of the fossil birds of Brazil, which, however, is not considerable. In 1844 he placed before the Société Philomatique of Paris a *résumé* of a work entitled "Remarques sur les oiseaux fossiles," which

was at once published in the 'Institut' *. After having discussed the fossil birds from other geological formations, he briefly mentions in this *résumé* the remains of birds from the Brazilian caves, and the scientific results of Lund's researches, at the same time increasing the number of species indicated by Lund, by some more discovered in a collection of Brazilian cave-bones which the Paris Museum at that time purchased from the late P. Claussen. The number of new species indicated by him, however, is only five; but he does not further describe them, and some of them had been most likely found by Lund without Gervais being aware of it. A species of *Cathartes*, however, larger than those now existing †, and an Owl were, if the determinations may be trusted, really new.

In the short section on extinct birds in Mr. Wallace's celebrated 'Geographical Distribution of Animals' there is, lastly, what we might think was a small addition to the fossil birds already known from the Brazilian bone-caves, because, in the few lines which the author has bestowed on this subject, we meet with the somewhat startling announcement that amongst the birds found in these caves there is also an extinct species of "the very isolated South-American genus *Opisthocomus*" (i. p. 164). On closer consideration, however, this statement can scarcely appear otherwise than doubtful ‡. Wallace does not seem to have himself seen or studied the bird-bones to which he refers; and, judging from the tenor of his words, it

* Vol. xii. (1844), pp. 294, 295. I am not aware that any more of this memoir than the *résumé* has been published.

† In Lund's palæontological collection I have not observed remains of any *Cathartes* or *Catharistes* "larger than the existing species;" but amongst the bones of birds collected by him during the last years of his cave-diggings there are the upper mandible and some more bones of a *Gypagus* nearly allied to or even identical with the now living *G. papa*. Perhaps this is the bird which Gervais denominates a *Cathartes*, to which genus Illiger, by whom it was established, referred *G. papa*, which is furnished with a crest, as well as those American Vultures which have no excrescences on the beak.

[‡ That this statement seems to have originated in a mistake has been already noticed (Encycl. Brit. ed. 9, xii. p. 29).—Ed.]

was his intention merely to give a very short extract of what others already had communicated. At the same time it seems that he had before him only Gervais's article in the 'Institut' and the few words which occur in Lund's letter in the 'Annales des Sciences Naturelles,' but that he did not know, or did not use, the latter's communication in the 'Proceedings of the Danish Royal Society of Sciences,' 1840-1841. However this may be, no remains of any *Opisthocomus* are mentioned in either of these places; and it must doubtless be struck out from the list of fossil birds found in the Brazilian caves, as we can scarcely doubt that it has found a place in Wallace's work only by some misunderstanding or slip of memory.

So far as I am aware, no further information concerning the fossil birds of Brazil than what I have mentioned has been published*; and we shall now return to a closer consideration of the principal result which Lund deduced from his studies in this department. To a certain extent this result is no doubt true; there can be no question that the bird-fauna of which the remains exist in the caves, whatever be the proportion of undoubtedly extinct species, had a thoroughly American character, just as fully as the mammalian fauna which lies buried there; and we are also certainly justified in maintaining that it contained at any rate some species which nowadays occur regularly in other parts of South America only, even if it should happen now and then at intervals of several years that specimens stray into the valley of Velhas†.

So far it may be said truly that the laws established "concerning the relation" between the extinct and the extant mammalian fauna "also hold good as regards the class

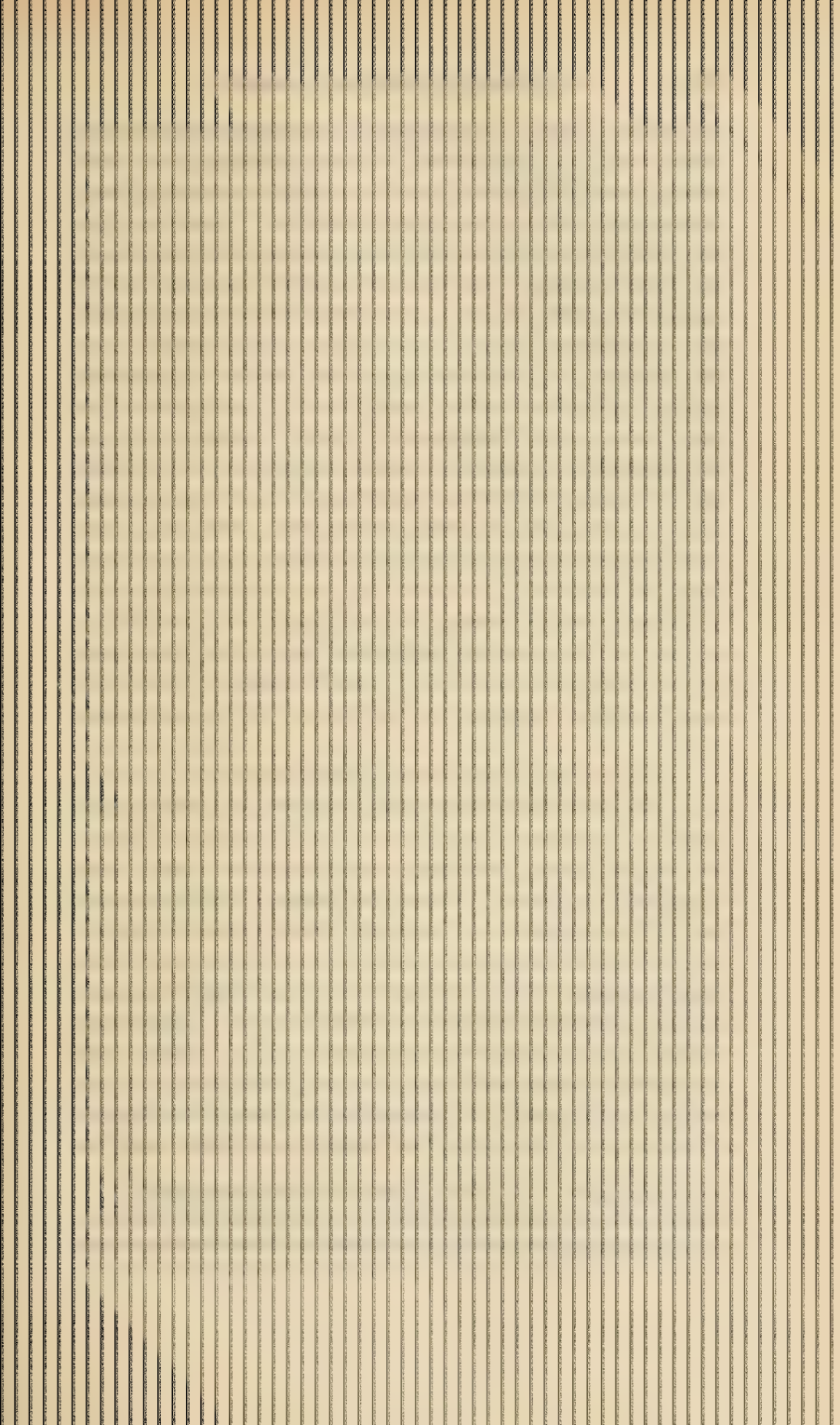
* Of course the short statements of Lund and Gervais on the fossil birds of Brazil were soon reproduced in several of the more important contemporary manuals and catalogues; but to these we need not refer.

† Lund's collection contains, for instance, several unregistered bones of a *Chauna* or *Talamedea*, birds which at present do not occur in the valley of the Velhas, but, at the most, now and then at intervals of several years stray thither (*Talamedea cornuta* see Nat. For. Vid. Medd. 1870, p. 22).

of birds"*. But there is, at any rate, one point with regard to which it may be doubtful whether the relation between the bird-fauna discovered in the caves and that now existing can fairly be said to agree with what is known concerning the corresponding mammalian faunæ. The most remarkable characteristic of the extinct mammalian world is, as is well known, this, that it contained not only several entirely extinct very large species of genera which are still in existence and peculiar to America—for instance, large species of *Hydrochærus*, *Cercolabes*, and *Dasypus*—but besides these a series of most remarkable gigantic forms which certainly exhibit an American character, but represent peculiar genera and families that have disappeared from the modern fauna, such as *Macrauchenia*, *Toxodon*, the gigantic Sloths, and the Glyptodons. Nothing similar appears to have been observed with regard to the remains of birds found in the caves; at any rate nothing approaching to it could probably be mentioned except in the case of the very large Aleкторid of which Lund believed he had found remains; and even if these have been rightly interpreted by him, this one species would scarcely afford a sufficient foundation for so important a conclusion as he founded on it. So much the more occasion is there for rendering an accurate account of the number and a description of the bones referred to this bird, and for submitting them to a renewed and careful examination.

They are but very few in number, strictly speaking only two, viz.:—the upper third or a little more of the right metatars, from which, however, the articular surface had been broken off from above, and which, more especially on the posterior face, was beset with incrustations; and, secondly, a digital phalanx which had lost the proximal articular surface, and also exhibited some incrustations. According to Lund's own words in his unpublished treatise, both these bones were found in the side of the same cave, and bore all the marks of belonging to one and the same individual; both moreover were figured, each from two sides, in the coloured drawings accom-

* Overs. over d. Kgl. d. Vid. Selsk. Forhandlingar og d. Medl. Arb. 1840-41, p. lxiii.



his catalogue by the same names as they are described in the treatise. The toe-bone alone was not entered in the catalogue nor found in the collection. But it does not, so far as I can judge, seem probable that Lund should have numbered and registered all the other remains of birds mentioned in the treatise, and in some cases less important, while at the same time he omitted to do this with regard to one of the most important, if he had really possessed it when writing the catalogue of his collection. I think, therefore, that this brittle and fragile bone (to judge from the existing drawings) must have disappeared while Lund was in Brazil, whether he lost it or whether, perhaps more probably, it fell to pieces. This loss is of course to be regretted; but in my opinion it is not of very great importance, as the two above-mentioned drawings, which are preserved, are sufficient to give a fairly good idea of it.

Illiger himself saw and examined only two out of the six genera of birds which he placed together in his family *Alectorides**; he knew the rest only from the not very satisfactory descriptions and illustrations of that time; and it is therefore easy to understand that his *Alectorides* became a somewhat promiscuous assemblage of dissimilar birds. Nor was Temminck's knowledge of them extensive; and even after removing from them the very divergent *Cereopsis*, the family did not become a natural group, and it has accordingly now been wholly abandoned. Nor did Lund himself know much of it. Of the three forms which were left longest in the group *Alectorides*, two—*Palamedea* and the Trumpeters—have not their home in those parts of South America in which he lived and worked; and the skeleton and internal structure of the former in particular were, at the time he wrote, very insufficiently or not at all known. The only one, therefore, which he knew accurately, and with the bones of which he could compare the few fossil remains which he thought belonged to a gigantic Alectorid, was the *Cariama*, which occurs in great numbers in the Brazilian campos—nay,

* That some ornithologists still use the name *Alectorides*, but in a different sense from Illiger's, need not be further mentioned.

even in the immediate vicinity of his own house at Lagoa Santa. His opinion that the fossil bird was generically different from *Cariama*, and formed a lost link between it and *Palamedea*, was founded not only on the difference which he perceived between the tibia of the former and that of the supposed gigantic Alectorid, but also, and perhaps mainly, on the consideration that, if the before-mentioned toe-bone also belonged to that bird, it must have had much longer toes than *Cariama*, of which the short toes had occasioned the generic name *Microdactylus*, bestowed upon it by Geoffroy St.-Hilaire.

The fossil bone-fragment agrees so accurately with the metatarsus of *Rhea* in size and proportion, that Lund began his examination of it by comparing it with this last bone ; but he did not observe any further similarity between them. In *Rhea* the anterior upper end of the metatarsal exhibits a deep, rather elongated, elliptical groove, which at its bottom branches off into two smaller fissures opening on the posterior surface of the bone. Both these fissures are remains of the original division between the three coalescent metatarsals ; and the groove in front is caused by the middle metatarsal being situated a little behind its two neighbours at the upper end, while at the distal extremity it advances forwards, so as to be not only on a level with the lateral bones but even a little in front of them. The fragment of the fossil metatarsus seems at first sight different, as may be observed in the annexed illustration (fig. 1, p. 330). The groove on the front surface is less deep and less sharply defined ; the two fissures at the bottom appear like small holes, each scarcely larger than a pin's head, and open on the posterior surface of the bone a little more distant from each other. Besides this, the front surface of the bone exhibits a swelling or knob nearly an inch long, pointed at the lower end, and situated in the groove on the front side of the bone below the fossa above mentioned.

The preceding description of the appearance of this bone in *Rhea*, however, is made from that of a young bird. The bone is certainly 370 millim. long, and is quite as large as that of many a full-grown bird ; but that portion of the tarsus which

is incorporated into the metatarsal has not yet quite coalesced with them, these parts being still separated by a thin layer of cartilage. If, instead, we examine the terminations of a not

Fig. 1.



Fig. 2.



Fig. 3.



Fig. 1.—Fragment of the tarso-metatarsus: natural size.

Figs. 2 and 3.—Copies of the drawings sent by Lund of the toe-bone (from the side and front) taken by him to be that of an extinct *Alectoriid*.

merely full-grown but old *Rhea*, we shall find that it looks somewhat different, and that it presents the very same appearances as are above described in the fossil fragment. In other words, this fragment no doubt belonged to an adult *Rhea*, and certainly not to a bird more or less allied to *Cariama*; it does not exhibit any striking similarity to the tarso-metatarsus of the latter in any particular. The same holds good with regard to the middle portion of a right tibia, marked No. 8 in Lund's collection, and in his catalogue stated to be of the same bird (gigantic Wader) as the tarso-metatarsus (No. 9). As this bone lacks the most characteristic parts (the two extremities), its agreement with the *Rhea*'s tibia would not perhaps be very clearly apparent from a description; but on placing the two tibiæ side by side, the similarity appears at once, in spite of the serious injuries which the cave-bone has suffered. It is a fragment of the bone, rather nearer to its distal than to its proximal end; and the striking flatness of its posterior surface compared with the high transverse convexity of the front, the slight indication of a ridge on this side along the interior margin; and, lastly, the just perceptible longitudinal curve inwards exhibited by the fragment, are all details found exactly reproduced in *Rhea*; so that, in my opinion, there can be no doubt that it belonged to that bird. Finally, as regards the digital phalanx, which Lund also ascribed to his gigantic Alektorid, thinking it belonged to the same individual as the fragmentary tarso-metatarsus, we have already said that we have only drawings to go by; and of these we give copies (figs. 2 & 3, p. 330). They show that this bone had been injured at the proximal end, but that only very little, scarcely more than the articular surface itself, was wanting. It is, moreover, easily perceived that even before being thus damaged this phalanx was at most but three times as long as it is thick, and that it by no means presented any similarity to the rather slender and very elongated digital phalanx of *Palamedea*. On the contrary, the drawings of this bone point no less clearly than the fragments actually preserved of other bones to *Rhea*; and it can scarcely be doubted that it was the first phalanx of the middle toe of that bird.

It is not easy to decide whether the species of *Rhea* to which these bones belong was identical with the existing *R. americana*. I have observed nothing in the few remains at my disposal that would contradict that view; and I consequently think that the ancient and the modern *Rhea* are of one and the same species; at the same time it must be admitted that additional discoveries of the bones of the ancient bird may possibly bring to light differences which could not be inferred from the insufficient fragments of bones now before us.

But if the interpretation here offered of the bones which have hitherto been looked upon as remains of an extinct gigantic Alectorid be true, at any rate in the main—that is to say, so far as the generic determination goes,—then it will be readily perceived that it must to a very considerable extent modify the opinion hitherto prevailing, that all the laws which hold good for the relation between the existing and the next preceding mammalian fauna of South America are equally valid in respect of the class of birds. On the contrary, there is an essential and fundamental difference. There is no indication whatever of the class of birds having possessed large extinct representatives, which could be said to exhibit a somewhat similar relation to the birds now living as that which the gigantic extinct Brazilian mammals present as regards the existing fauna.

I do not mean wholly to deny that the remains of birds found in Brazilian caves may in some cases belong to really extinct species; on the contrary, I consider this very probable. But it is only through a renewed careful examination of the bones that it can be ascertained how many really extinct species have been discovered—or in other words, the exact proportion between really extinct and still living species in the cave-finds. Under all circumstances it may even now be asserted, with all confidence, that the extinct bird-fauna of which the remains are found in the caves of Brazil differs from the existing fauna *in a much less degree* than the mammalian fauna which is buried there.